

OPEN NOMENCLATURE

by PETER BENGTON

ABSTRACT. Open nomenclature plays an important role in taxonomic decisions by palaeontologists, but usage and interpretation of the signs employed vary considerably. Prevailing fashion seems to favour **aff.** to indicate affinity of a potentially new, as yet undescribed species with a known species, whereas **cf.** and **?** indicate uncertainty. Use of **aff.**, **cf.**, and **?** for different *degrees* of uncertainty, as recommended by some workers, leads to instability in interpretation. Abbreviated taxonomic expressions such as '*Trichiurus cf. lepturus*' are unambiguous and are to be preferred to '*Trichiurus cf. T. lepturus*'. Careful, judicious use of open nomenclature is to be encouraged and should be covered by the *International Code of Zoological Nomenclature*. A set of recommendations is given.

IN a recent article Lucas (1986) discusses the use of the qualifiers **aff.** and **cf.** in taxonomy, and more specifically their proper position in taxonomic names. Such expressions are usually termed 'open nomenclature'. Lucas refers to the *International Code of Zoological Nomenclature* (International Commission on Zoological Nomenclature, 1985) to support his contention that the common procedure of inserting **aff.** and **cf.** between the generic name and the specific name is syntactically incorrect. However, since the *Code* makes no provision for cases of open nomenclature, his arguments lack authority and arguably credibility. Nevertheless Lucas's article alerts us to the fact that the status of open nomenclature is neglected, perhaps needing a set of rules or recommendations by the International Commission on Zoological Nomenclature. Although I was inspired to write this article by Lucas's note, I have been concerned for some time about the inconsistent approaches to open nomenclature. These circumstances lead to fluctuating interpretations of taxonomic statements which, in turn, may impede scientific communication. This article aims to deal with the core of the subject of open nomenclature, on which ideally there should be no argument. For more detailed discussions regarding special cases and more arcane expressions in open nomenclature, the reader is referred to Richter (1948) and Matthews (1973).

OPEN NOMENCLATURE

Use of open nomenclature is the procedure by which a taxonomist comments upon the identity of a specimen that cannot be readily or securely determined. The procedure is more common in palaeontology than in neontology, a fact that, of course, stems from the incompleteness of most palaeontological material. Uncertainty or the provisional status of a taxonomic identification may be expressed in prose, such as 'probably *Agenus aspecies*', but is more often codified through the use of qualifiers such as **aff.**, **cf.**, or **?**. Richter (1943, pp. 34–40; 1948, pp. 45–52) treated the subject of open nomenclature in detail, and Matthews (1973) is essentially a translation of Richter's work. Richter emphasized the need for open nomenclature: should a specimen be too hastily referred to a known species or genus, taxonomic information may be concealed or distorted. If on the other hand the specimen is left without any attempt at identification, potentially useful information may be left in limbo. In order to derive the maximum benefit from any specimen with a minimum of distortion of information, open nomenclature is an essential tool in the taxonomist's repertory.

As expressed by Richter (1948) (and Matthews 1973), open nomenclature is an especially perspicacious form of nomenclature. Careful and judicious use of open nomenclature reflects scientific honesty; its use is not a sign of weakness or lack of confidence, contrary to the opinion of some taxonomists.

THE SIGNS IN OPEN NOMENCLATURE

By far the most common signs used are **aff.**, **cf.**, **?**, and **sp.** The question of the position of **aff.** and **cf.** within the binomen (Lucas 1986) is trivial in comparison with the problem of vacillating interpretations of the signs. Since the *International Code of Zoological Nomenclature* refrains from any reference to open nomenclature, taxonomists are left to their own subjective interpretations of what the signs stand for in each individual case. However, since neither Richter's (1948) nor Matthews's (1973) works seem to have been widely accepted by our community, I suggest that the time is ripe for a more stringent approach to open nomenclature.

My impression is that the following usage prevails among palaeontologists:

aff. (or **n. sp.**, **aff.**, or **sp. nov.**, **aff.**) preceding a species-group name indicates that the specimen(s) is considered a new, previously undescribed species or subspecies. The material is insufficient for formal description and naming of a new taxon, but the specimen(s) can be most closely related to the species or subspecies following the qualifier. Thus, **aff.** does not necessarily involve uncertainty. Some workers make a distinction between **aff.** and **n. sp.**, **aff.**, using **aff.** alone to signal that the specimen(s) differs clearly from the holotype but may still fall within the limits of variation of the species (e.g. Kennedy and Hancock 1971, p. 437).

'...', i.e. quotation marks, around a genus-group name indicate that the species is thought to belong to a new genus (or subgenus) related to the named genus, but the material available is insufficient for the formal erection of a new genus. (Obviously, an **aff.** in front of the genus-group name will convey the same message but is for some reason little used.) Quotation marks around a generic name are also used to indicate that the name is obsolete (cf. Jeppsson and Merrill 1982).

cf. preceding a species-group name (rarely a genus-group name) indicates that the determination is uncertain, the reason for which may be poor preservation of the material studied or that the determination is provisional.

? overlaps partly in usage with **cf.**, although the former is less frequently used for provisional determinations.

sp. (and **ssp.**) indicates that the specimen cannot be related to any established species (or subspecies) or that specific identification has not (yet) been attempted.

These signs cover the majority of situations where open nomenclature is required. Other, less commonly used expressions, such as **sp. indet.**, **sp. A**, **ex gr.**, are in most cases self-explanatory.

Current usage as discussed above differs fundamentally from Lucas's (1986) opinion that **aff.** and **cf.** express different degrees of uncertainty. If uncertainty is involved, it is rather a matter of different *kinds* of uncertainty.

The reason for **aff.** and **cf.** being less commonly used for genus-group names can be sought in the differences in definition of species and genera, respectively. The inherently greater uncertainty in the genus concept does not normally call for yet further qualification. A question mark, which should be placed *after* the generic name (cf. Kornicker 1979), is sufficient for most situations. Incidentally, **cf.** stands for *confer*, not *conformis* (Lucas 1986), which means 'compare to', rather than 'compare with'. The difference may appear academic, but is worth considering. The wording 'compare to' expresses a possible identity, which is what most taxonomists have in mind when they use **cf.**, whereas 'compare with' rather implies a distinction (cf. Fowler 1982, pp. 99–100), thus approaching **aff.** in meaning.

A comparison of current usage with that recommended by Matthews (1973) also shows some differences. Apparently quoting Richter (1948), Matthews states that **cf.** implies only a possibility of comparison with the named species, whereas **?** means that attribution to the species is possible but cannot be thought certain. I take this to mean that **cf.** is meant to express greater uncertainty than a **?**. It is interesting to note that in the first edition of Richter's book (Richter 1943, pp. 37–38) the reverse practice was recommended. At that time Richter considered **cf.** to mean that attribution to the species

is probable but uncertain, whereas a ? would mean that attribution is improbable but possible. In Richter's original view, then, *cf.* would express less uncertainty than a ?, i.e. exactly the opposite of the recommendation given in his second edition of the book. The change was explained and said to have been made to achieve conformity with prevailing usage in the literature (Richter 1948, p. 49). This illustrates how codification of degree of uncertainty is bound to lead to varying and unstable usage, so it is only natural that *cf.* and ? are considered synonymous in open nomenclature by a majority of taxonomists. If both signs are to be retained in open nomenclature, the differences in *kinds* of uncertainty should be emphasized rather than an ill-defined difference in degree of uncertainty.

SYNTAX

What then is the 'proper syntax' when using the signs in open nomenclature? Lucas (1986) refers to the *International Code of Zoological Nomenclature* in advocating that expressions like '*Trichiurus cf. lepturus*' are incorrect, and that the correct syntax is '*Trichiurus cf. T. lepturus*'. His reference to the *Code* is curious, since it is not concerned with open nomenclature and thus cannot prohibit the insertion of *cf.* or *aff.* between the generic name and the specific name. What is recommended (not prescribed) by the *Code* is that names of a former generic association should be given as a supplementary piece of information within parentheses rather than interpolated between the generic and specific names (Recommendation 6A), as often occurs. The reason is presumably that an interpolated generic name, even in square brackets, might be mistaken for a subgeneric name, the interpolation of which is the correct procedure. I agree entirely with Lucas (1986) that taxonomic nomenclature 'should be as precise and unambiguous as possible'. But in the case of an interpolated *aff.* or *cf.* no confusion is possible, and this is, of course, why many palaeontologists prefer the shorter, more convenient construction. To write '*Trichiurus cf. T. lepturus*' instead of '*Trichiurus cf. lepturus*' contributes nothing to clarity. The latter expression conveys in an unambiguous way the message that the author considers the specimen in question to be 'probably or possibly the species *lepturus*, although there is not enough material to be sure, but if it is *lepturus* it should be referred to the genus *Trichiurus*'.

Lucas (1986) also is correct in stating that 'the phrase "cf. *lepturus*" in "*Trichiurus cf. lepturus*" does not actually mean that the specimen(s) in question should be compared to *Trichiurus lepturus*', but his motives for saying so are contorted. The meaning of the expression is that the specimen(s) should be compared to the species *lepturus*, which the author refers to the genus *Trichiurus*, i.e. the uncertainty lies at the specific level, not at the generic level. Lucas continues: 'That different species can have the same specific name . . . underscores the fact that a species is identified by a binomen, not by just its specific name.' It is exactly the opposite: a species *is* identified by its specific name (and its author), not by a binomen. This is why it is important to include authors' names (and year) in taxonomic nomenclature, as emphasized by Richter (1948) and Matthews (1973) in the statement 'These two names (species+author) make up a nomenclatural entity, which nothing should be allowed to divide.' Although the inclusion of authors' names is left optional by the *Code* in key positions a species-group name should never be cited without its author. By following this practice the problems of homonymy can be practically eliminated, since there are few cases where an author during the course of the same year has given the same specific name to closely related taxa. Since a species is identified by its objectively defined species name, not by any subjective binomial combination, the expression '*Trichiurus cf. T. lepturus*' is, strictly speaking incorrect syntax. It implies that the specimen(s) should be compared to only those specimens that have been described under the name *T. lepturus*, which is hardly what is meant.

Abbreviation of taxonomic names, as discussed above, is often practical in applied palaeontology. For example, a biostratigraphic zone may be referred to as 'the *plenus* Zone', when it is understood that the '*A. plenus* Zone' or the '*Actinocamax plenus* Zone' is intended.

CONCLUSIONS

The fact that usage varies considerably, that the recommendations of Richter (1948) (and Matthews 1973) have not been universally adopted, and the fact that time and ink are expended on discussing the meaning of the signs used in open nomenclature is a strong motive for the International Commission on Zoological Nomenclature to consider issuing rules or recommendations on open nomenclature. Such recommendations may not put an end to discussions on the matter but they will provide a nomenclatural pillar to lean on.

Analysis of current usage and the reasoning outlined above impels me to formulate a set of recommendations. These are presented here for discussion, and hopefully as a first step towards a formal proposal on open nomenclature to the Commission. As suitable fora for discussion of the matter I suggest, for example, the *Palaeontological Association Circular*, the *Lethaia* 'Seminar', or the section 'Points of view' in *Systematic Zoology*. I shall, of course, also be glad to receive comments by letter.

RECOMMENDATIONS

aff. relates a new, undescribed taxon to a named taxon: e.g. *aff. Agenus aspecies* (for a new genus), *Agenus aff. aspecies* (for a new species), *aff. Agenus aff. aspecies* (for both a new species and a new genus).

cf. indicates that the identification is provisional: e.g. *cf. Agenus aspecies* (for a provisionally assigned genus), *Agenus cf. aspecies* (for a provisionally identified species), *cf. Agenus cf. aspecies* (for both a provisionally assigned genus and a provisionally identified species).

? indicates that the identification is uncertain: e.g. *Agenus? aspecies* (genus uncertain), *Agenus aspecies?* (species uncertain), *Agenus? aspecies?* (both genus and species uncertain).

sp. (or **ssp.**) indicates that specific identification is impossible or has not been attempted, **n. sp.** (or **n. ssp.**) that the species (or subspecies) belongs to a new species and cannot be associated with any known species.

'...' indicates that the name is obsolete in the immediate context of systematic interest: e.g. '*Agenus*' *aspecies* (generic name obsolete), *Agenus* '*aspecies*' (specific name obsolete), '*Agenus aspecies*' (both generic and specific name obsolete).

These rules are intended to cover the great majority of situations where full identification is not possible. As is the case today, **aff.** and **cf.** will probably continue to be less commonly applied to genus-group names.

Acknowledgements. I thank William T. Dean (University College, Cardiff) for constructive criticism and advice. The English was kindly improved by Simon Conway Morris (University of Cambridge). The work was supported by Swedish Natural Science Research Council (NFR) grant No. G-GU 3475.

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Typescript received 12 December 1986

Revised typescript received 20 April 1987

Note added in proof. After the completion of the manuscript, two notes have appeared commenting on Lucas's (1986) article. Zidek (1987) advocates that **cf.** and **aff.** are synonymous and used for tentative identifications, and that their meaning equals that of a question mark. Estes (1987), on the other hand, maintains that **aff.** indicates a greater degree of confidence than **cf.** Both these opinions differ from prevailing usage, as discussed in the present article; this further underscores the need for standardization of the signs in open nomenclature.

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